

Wood Stove Design Challenge Protocol – Automated Stove Competition

Stove: Stove X
Dimensions: 16L x 11H x 21W
Volume: 2.16 ft³

- Fuel species – beech or maple
- Fuel length proposed – 16” – *Note that piece weights will change, if length is changed*
- Fuel moisture – 18% - 25%
- For all portions of the protocol, the excessive smoke protocol will be applied, if deemed appropriate.

Start-up

Phase length: up to 30 minutes

Fuel load density 4 lb/ft³

Amount of kindling: not to exceed 2.2 lbs piece size in sticks and must resemble typical kindling, typically 8-10 pieces of kindling weighs 1 lb.

Amount of starter fuel: 6.5 lbs +/- 5% -

Minimum weight for each starter fuel piece = 0.80 lbs

1. Stove is empty – no ashes
2. Amount of paper for starter – 6 full sheets
3. Amount of kindling is 2.2 lbs.
4. Amount of starter fuel is 6.3 lbs.
5. Fuel loading pattern is defined by the manufacturer's instructions. If no instructions are provided, a top-down burn protocol will be used. For the competition, the manufacturer can build the fuel charge in the stove but cannot light off and will be hands off during the stove testing. For startup phase – fuel can be loaded in multiple batches but all fuel must be loaded within the first ten minutes of the phase.
6. Air settings will be determined by the manufacturer. Up to 2 changes in air settings can be used during the start-up phase.
7. Fire will be started with a torch. Torch can be used for up to 30 seconds
8. Door can remain open for up to 5 minutes. Manufacturer will set time and door position prior to competition.
9. For the first 15 minutes, the door can be opened and fuel adjustments made. A maximum of four fuel adjustments can be made. Door can remain open for no more than 30 seconds per fuel adjustment. Door must be closed as soon as fuel adjustment is complete.
10. Phase ends after 30 minutes or when there is loss of yellow flame, whichever comes first. If Start-up ends before 30 minutes, it should be noted in the testing comments but no loss of points will occur.

1st Reload

Phase length: 45 minutes

Fuel load density 5 lb/ft³

Allowable fuel piece weight: 2.30 – 4.00 lbs

Target pieces for load: 4

Fuel load weight: 11.0 lbs +/- 5% -

1. Immediately after the end of Start-up Phase, open stove door.

2. Chop existing wood with a fuel piece and to the extent possible smooth coalbed.
3. Load 1st Reload charge following the specifications for this phase provided above.
4. Fuel loading pattern defined by the manufacturer's instructions. Options are:
 - a. East/west
 - b. North/south
 - c. Criss-cross
5. Close door immediately after loading fuel. Maximum time to reload 60 seconds.
6. Air settings/thermostat immediately turned to low demand
7. During 1st reload phase one (1) fuel adjustment is allowed. Additional fuel adjustments can be requested but the total score deduct 2 points for each additional fuel adjustment. Door can remain open for no more than 30 seconds for a fuel adjustment. Door must be closed as soon as fuel adjustment complete.
 - a. Teams can make recommendations about when and how to make fuel adjustments.
 - b. Additional fuel adjustments interventions can be made at the request of the stove team. Each additional fuel adjustment results in a loss of 1 points from scoring.
8. Air Adjustments - During the 1st Reload phase no air adjustments can be made unless judge(s) determine an intervention is required. Each intervention results in a loss of 2 points from scoring for every x minutes the air settings differ from the protocol. Interventions that result in point loss, will be completed upon request by the stove team.
9. 1st Reload Phase ends after 45 minutes.

2nd Reload

Phase length: 30 minutes

Fuel load – 2 pieces

Allowable fuel piece weight: 4.5 lbs +/- 5%

1. Immediately after the end of 1st Reload Phase, open stove door.
2. Break up/chop/reposition remaining fuel to the extent possible.
3. Load 2nd Reload charge following the specifications for this phase provided above.
4. Fuel loading pattern defined by the manufacturer's instructions. Options are:
 - a. East/west
 - b. North/south
 - c. Criss cross
5. Close door immediately after loading fuel. Maximum time to reload 60 seconds.
6. Air settings/thermostat immediately turned to high demand
7. During 2nd Reload phase no fuel adjustments are allowed.
 - a. Fuel adjustments can be requested but the total score deduct 1 point for each additional fuel adjustment. Door can remain open for no more than 30 seconds for a fuel adjustment. Door must be closed as soon as fuel adjustment complete.
8. Air Adjustments - During the 2nd Reload phase no air adjustments can be made unless judges determine an intervention is required. Each intervention results in a loss of 2 points from scoring for every x minutes the air settings differ from the protocol.
9. 2nd Reload Phase ends after 30 minutes.

3rd Reload

Phase length: 75 minutes

Allowable fuel piece weight: 2.30 – 6.00 lbs

Target pieces for load: 5-8 - load should be a 50/50 mix of small and large pieces

Fuel load weight: 21.6 lbs +/- 5%

1. Immediately after the end of 2nd Reload Phase, open stove door.
2. Break up/chop/reposition remaining fuel to the extent possible.
3. Load 3rd Reload charge following the specifications for this phase provided above.
 - a. Load large piece first, then small piece, large piece, small piece, etc until no more wood fits in the stove. *Likely that up to 2/3 of load may not fit in but as much as possible should be loaded with a mix of small and large pieces.*
4. Fuel loading pattern defined by the manufacturer's instructions. Options are:
 - a. East/west
 - b. North/south
5. Close door immediately after loading fuel. Maximum time to reload 90 seconds.
6. Air settings/thermostat immediately turned to low demand
7. During 3rd Reload phase one (1) fuel adjustment is allowed within the first 10 minutes of the phase.
 - a. Additional fuel adjustments interventions can be made at the request of the stove team. Each additional fuel adjustment results in a loss of 1 points from scoring. Door can remain open for no more than 30 seconds for a fuel adjustment. Door must be closed as soon as fuel adjustment complete.
8. Air Adjustments - During the 2nd Reload phase no air adjustments can be made unless judges determine an intervention is required. Each intervention results in a loss of 2 points from scoring for every x minutes the air settings differ from the protocol.
9. 3rd Reload Phase ends after 75 minutes.

Disruption Phase:

1. No wood is loaded.
2. Unit is placed in disruption mode, this could be: eliminating power, disengaging catalyst, etc.
3. Disruption phase lasts 30 minutes.